A NEW ADHESIVE PLASTER

ESPECIALLY ADAPTED TO THE REQUIREMENTS OF MODERN SURGERY.[1]

BY HENRY A. MARTIN, M. D.

AMONG the numerous improvements which have lately, in rapid succession, illustrated the advance of surgery, none, it seems to me, has already been so fertile in practical results as that which the profession owes to an American "country doctor,"[2] the use of adhesive plaster as a means for extension.

In the treatment of fractures it affords an invaluable and faultless appliance in place of a host of contrivances which, however ingenious and complicated, were, judged by their effects, wofully defective, and ulcerated groins and ankles and sloughing heels have ceased to be *opprobria* of the surgeon. The treatment of diseased hip-joint and that of fractured clavicle, associated with the distinguished American names of Davis and Sayre, could not have been accomplished but for this simple and admirable invention.

Adhesive plaster has become a most important matter. The ordinary article is spread upon a fabric of an extremely flimsy texture, the apparent substance of which is mainly composed of "dressing," which dissolves upon the slightest application of moisture, and the plaster itself is made of ingredients so prone to rapid change and deterioration that, unless very freshly made, it is worthless. Although this is largely employed, it is for want of anything better. A superior quality of adhesive plaster is made by Maw and Sons, of London, and much imported for surgical purposes. It is of the best possible quality of the "classic" emp. adh. spread on a close, strong cotton fabric called moleskin. This, although as good as "officinal" adhesive plaster can be made, and infinitely superior to that in ordinary use, is liable to deterioration, however carefully kept, from time, air, light, and heat. It also requires the careful and troublesome application of heat to render it adhesive, and when of a certain age it cannot, even by heat-

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[2] The late venerable Dr. Josiah Crosby, of Manchester, N. H. The fact that more than one generation of practitioners in a corner of Pennsylvania employed plaster straps for extension in fractures of the leg and thigh, and that about one hundred years ago the eminent Benjamin Gooch, of Norwich, Eng., made similar use of plaster, does not invalidate Dr. Crosby's claim. He supposed that the invention was his own, and it was not till I informed him that others had to a certain extent preceded him that he had the slightest suspicion of the fact. To Dr. Crosby the profession owes the knowledge of this most important improvement. Before his papers in the Philadelphia Journal and his remarks to various medical associations the use of plaster straps for extension was confined to a limited circle of rural practitioners, and its only record in a forgotten tract and a little book on minor surgery. To the man who, like Jenner, labors and strives to give the profession and humanity the benefit of an invention or discovery is honor due, and not to him who either keeps his invention to himself or does nothing to make it known.

ing, be made available. Every surgeon is well aware how much trouble he experiences in heating his plaster straps so that they shall adhere equally in their whole length, and how difficult to attain that just mean of plaster, warm enough to stick and yet not so hot as to burn his patient's skin. We all know that if such plaster is not applied at once after being heated it cannot be applied without re-heating, the consequence of which is that strapping a breast or adjusting plaster extension to a fractured thigh is very often a tedious process, consuming a great deal of plaster and patience, and leaving the surgeon's fingers and nails coated and stuffed with a deposit of lead plaster, by no means easy of removal. I doubt not that every one of my readers has been, more than once, seriously annoyed to find that all the plaster in his pocket case or office has become quite worthless; frequent and most troublesome renewal of supply will alone, and that imperfectly, afford protection from such annoyance.

Another defect of all varieties of the officinal spread adhesive plaster is that it is almost impossible at any temperature, quite so during summer, to prevent its becoming so adherent to the thin "tissue" paper which is laid over its surface as to be capable of separation only by a tedious washing off of the paper, a process which renders the plaster almost worthless. I need not here dwell further on the many defects of the familiar sticking-plaster, for nothing can be better known to the busy surgeon.

The plaster called "Liston's" and "isinglass," made by spreading a solution of albumen on silk, has, during the past thirty years, been used to a certain extent as a substitute for common adhesive plaster. When prepared as Liston directed, spread with a brush on good oiled Florence silk, it is an excellent article, and useful in a certain limited class of cases. As, however, it now exists "in commerce," spread on a most flimsy sort of silk gauze, it is of little value. The idea that its adherence is unaffected by the application of moisture is an utterly fallacious one; under certain circumstances it is very irritating to the skin, and, of course, however well prepared, is of no use whatever for the more important surgical needs. There is another sort of plaster, made both in England and this country, composed of a solution of gum caoutchouc with various gums and resins in naphtha, or some such solvent, spread on thin cloth by means of what is technically called a comb. This "rubber plaster" possesses valuable qualities, but is found in practice — probably on account of the solvent it contains — to irritate the skin if applied to it for any considerable length of time. Probably, also, from the action of the solvent on its ingredients, it tends to deteriorate rapidly in quality, however carefully kept.

A plaster of great adhesiveness, and at the same time unirritating to the skin, even if long applied, spread on so strong and closely woven a fabric as to bear any possible necessary amount or continuance of traction, little or not at all liable to change from time or ordinary climatic variations in temperature, and instantly applicable, without heat, at all temperatures, has been hitherto a desideratum. No experienced practical surgeon can doubt that a plaster fully and fairly meeting all these requirements would be a most valuable addition to his *armamentarium*.

It is the hope and belief of the writer that he can now introduce precisely such an article to the notice of the profession.

Some eleven or twelve years since I ascertained that at the great rubber factory in Roxbury cloth was spread with a compound of India rubber with a small proportion of common rosin. This compound was effected, not by solution, but by the infinite kneading together of the ingredients between rollers at a certain degree of heat. The cloth was prepared for purposes quite apart from surgery, but, coming under my notice one day, I was struck with its fitness for all the uses, and especially for the more important modern uses, of adhesive plaster. I procured two or three yards, and afterwards, at various intervals, several further supplies of it. The very first case in which I used it was for wide strips to approximate the large incised wound of ovariotomy, and at the same time extending widely to support the abdominal walls. It answered these purposes admirably. I used it in fractures of the leg and arm to attach and fix splints to the limb, in many cases of incised wounds, and particularly those of the scalp and bearded parts of the face, and others in which muscular action tended continually to separate the sides from each other; also in one case of fractured thigh. In all the cases in which I employed it I found it to answer excellently, but it was so excessively adhesive that it was very difficult to handle, and I felt that it could not prove generally useful. I was, however, confident that if variations were made in the sort and proportion of ingredients it was extremely probable that valuable results might be attained. I always intended to pursue the investigation, but shortly after my attention was first called to this subject a great and long-continued pressure of business connected with my devotion to the subject of animal vaccination and its introduction, now fully accomplished, into this country prevented my attending to this and many other matters.

Somewhat more than one year since I commenced my experiments in this direction. It is needless to weary the reader with a narrative of my failures, troubles, disappointments, and annoyances, all familiar enough to any one who has embarked in such an enterprise. If I had foreseen them all it is very doubtful if I should ever have undertaken the investigation. All that it is necessary to state here and now is that at last I did succeed in attaining the end I sought, in the production of a plaster which, so far as most strict and frequently repeated testing in every possible variety of case and application by myself and a very large number of surgeons to whom I have distributed it, seems exactly to meet all the requirements I have enumerated as desirable. I have sent supplies to many eminent surgeons, and from almost all — all from whom I have heard — have received the warmest possible expressions of approval.

The compound of which this plaster is made is of the very best Para rubber, Burgundy pitch, and balsam of tolu.[1] The latter ingredient,

[1] Very remarkable virtues are ascribed by a recent French writer to balsam of tolu as an application to wounds, ulcers, and contusions, and also as a lotion and injection in various inflamed and irritated conditions of the skin and mucous membranes. Its use in my plaster was on account of its peculiar sort of adhesiveness, and also with a view, through its very agreeable fragrance, of avoiding a resinous odor which might be objected to by sensitive patients. Made with this balsam, plaster is much less irritating to the skin when long applied

besides contributing an agreeable fragrance, has an important effect in rendering the plaster unirritating to the skin and improving it in other respects. These are the essential ingredients; they are combined and spread on a very strongly woven cloth (which has been thoroughly "shrunk" and deprived of every trace of "dressing" by treatment with the eminently antiseptic liq. zinci chloridi of Bennett [1]) by means of extremely expensive and exquisitely adjusted machinery, contrived for different and very important manufacturing purposes, but perfectly adapted to this new production. I need not give here a detail of cases in which my correspondents and myself have used the plaster; enough that it has been found to be all that can be desired in all cases, and of very especial value for purposes of extension in fractures, etc., in wounds of the scalp and bearded and hairy parts of the body, and in those cases in which muscular action and gravitation tend to a separation of the sides of wounds; for strapping for ulcers, the breast, and testicle; for attaching and fixing splints, and in treating fractured patella by Sanborn's method. It has been tested in an atmosphere below zero and found perfectly and readily adhesive, while in one at 100° it has been not more so. Specimens made a year ago evince no signs of change or deterioration, and those of a similar product made more than ten years since retain adhesive and other qualities.

At some future time I may publish the commendations of very distinguished practitioners which I have received, but as I have not asked for formal permission to that end I do not feel at liberty to do so now.

I have transferred the entire commercial charge of this invention and manufacture to my old and valued friends Messrs. T. Metcalf & Co., of Boston, and I have requested them to present a specimen of the plaster to any physician who may apply, either personally or by letter, that a full examination and testing may be made inexpensively by all who desire. If any of my readers should avail themselves of this opportunity and use the plaster, I should be much obliged by their giving me their opinion of it if favorable, and still more, if, for good reason, it is unfavorable. I have conscientiously endeavored to test it fully before troubling the profession with this announcement, but defects may be revealed by time or to other observers, and I am extremely anxious to be made aware, and to make others aware, of such possible defects as soon as they may be discovered.

than that made without it. On account of these advantages it is and will be an ingredient notwithstanding its high price.

[1] This antiseptic treatment of the cloth is not merely or chiefly with a view to rendering it directly destructive of the much-dreaded bacteria, etc., but to remove entirely the dressing, composed of substances extremely prone to fermentation and decomposition, with which all "finished" cotton cloth is filled. It also contracts the cotton fibre, diminishing the width of the cloth one thirty-sixth, and in this way renders it closer and better. If my readers wish to know exactly what "dressing" is, let them soak a piece of the ordinary "spread" sticking-plaster in warm water for a few minutes, and then see how much is left of the cloth on which it is spread.